

Incontinence risk factors and epidemiology

(Czynniki ryzyka inkontynencji i epidemiologia nietrzymania moczu)

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Abstract – The authors have discussed the factors causing urinary incontinence and emphasised their interferential activity. Such pre-disposing factors as: sex, race, genetics, anatomy, neurology, connective tissue issues, cultural and environmental background have been discussed in detail. The significance of the following promoting factors has been presented: obesity, occupation, recreation, surgeries undergone, smoking, chronic cough, urinary tract infections, irregular menstruation, medication effects, diet, menopause, and decompensation factors (age, dementia, mental handicap, other diseases, medication effects, and environmental factors).

Key words - urinary incontinence, pre-disposing factors, promoting factors, decompensation factors.

Streszczenie – Autorzy scharakteryzowali czynniki powodujące występowanie nietrzymania moczu, podkreślili ich interferencyjne działanie przyczynowe. Szczegółowo zostały omówione takie czynniki jak czynniki predysponujące: płeć, rasa, czynniki genetyczne, anatomiczne, neurologiczne, związane z tkanką łączną, kulturowe, środowiskowe. Przedstawiono znaczenie czynników promujących: otyłość, wykonywany zawód, rekreacja, przebyte operacje, palenie papierosów, przewlekły kaszel, zakażenia dróg moczowych, nieregularne miesiączkowanie, polekowe, dietetyczne, menopauza, oraz czynników dekompensacyjnych: wiek, demencja, niedorozwój umysłowy, inne schorzenia, działanie leków, czynniki środowiskowe.

Słowa kluczowe - nietrzymanie moczu, czynniki predysponujące, czynniki promujące, czynniki dekompensacyjne.

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- A. The idea and the planning of the study
- B. Gathering and listing data
- C. The data analysis and interpretation
- D. Writing the article
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I. INTRODUCTION

Many different classifications of urinary incontinence in women have been defined. The causes of incontinence often overlap and they are: genetic factors, environmental factors, and lifestyle.

The classification of incontinence factors [1-3] :

- *Pre-disposing factors*: sex, race, genetics, anatomy, neurology, connective tissue problems, cultural and environmental background.
- *Promoting factors*: obesity, occupation, recreation, surgeries undergone, smoking, chronic cough, urinary tract infections, irregular menstruation, medication effects, diet, menopause.

- *Decompensation factors*: age, dementia, mental handicap, other diseases, medication effects, environmental factors.

I. RISK FACTORS OF URINARY INCONTINENCE

Pre-disposing factors [1,2,4-9]

- Sex – regardless of age, urinary incontinence is more frequent for women than men in a given age group. Stress incontinence is more frequent in women as an outcome of many risk factors discussed later on. With age, the number of cases of incontinence caused by urgency is more and more even between women and men.
- Genetic factors – the frequency of incontinence has been observed to rise three times when analysed on first-degree relations. Women with congenital diseases (for instance, Ehlers-Danlos syndrome) are more frequent to suffer from incontinence. Children incontinence is undoubtedly linked to the chromosome XII genes. In fascia biopsies of pelvis in people suffering from urinary incontinence, less collagen was observed. The ratio of collagen type I to collagen type III was smaller, too.
- Race – the impact of race on urinary incontinence is different in relation to stress incontinence and to urinary urgencies with urinary incontinence. 200 women were assessed, including 54 black ones. The evaluated factors were: causes and types of incontinence, obesity, the occurrence of diabetes and lowered pelvis organs, and the number of child deliveries. Black women with incontinence were much heavier, had more deliveries, had diabetes much more frequently and had more overreactive bladder and urethra. What has to be emphasised is that racial differences in incontinence are related to many factors, including genetics, lifestyle, environment, culture, and social factors.
- Neurological factors – problems with conducting nerve impulses to lower urinary tract might be a cause of incontinence as a result of urges and stress incontinence. Among multiple neurological diseases, the notable ones include: variations of spondylosis, and herniated lumbar-sacrum discs. 85% of patients suffering from Parkinson's complain about urinary urgency and polyuria. 70% of people after strokes reported incontinence caused by urinary urgency (this number decreases to 10% after a year). 30% of patients with multiple sclerosis claim they have problems with incontinence.

- Anatomic factors

Patients with forms and degrees of flaccid uterus bottom and dysfunctional urethra sphincter are likely to suffer from stress or urge incontinence. Lowered pelvic floor may produce the symptoms of incontinence. Pelvic floor dysfunction results in impaired pelvic organs (bladder, uterus, large intestine) activity and sexual disorders.

- Connective tissue problems

Lowered pelvis floor and perivaginal defects in women suffering from incontinence are related to the anomalies in the collagen structure. Collagen is the main component of pelvic fascia. Various types of collagen appear in women with incontinence issues and in those without them. The state of collagen in women suffering from incontinence was analysed and compared to that of women without the problem. Women suffering from incontinence had less collagen shown in pelvic fascia biopsies as compared to the control group. At the same type, they had a higher collagen type I to collagen type III ratio. Collagen type I appears on bones and tendons, and type III is present in vessels and intestines, so in places where the tissue is supposed to be less rigid and more flexible. Other observations were: decreased absorption of collagen by fibroblasts in women suffering from incontinence and higher concentration of enzymes decomposing collagen in the serum [4,7,8,9].

Promoting factors

Promoting factors, i.e. those that support the occurrence of urinary incontinence, more often than not can be eliminated or at least controlled. Usually, they are related to lifestyle, so the person is capable of changing them or exercise prevention [4,7].

- Bowel dysfunction

Incorrect functioning of bowels affects continence and may even lead to incontinence. The cause of the two might be common. It was observed that chronic constipation can affect continence, regardless of their cause [4,8,9].

- Menopause

In the literature on the subject, different opinions have been presented on the direct impact menopause has on incontinence. Most reports on urinary incontinence during menopause mention high frequency of this ailment (from 19% to 70%). Problems with continence are reported to most commonly occur during menopause. The relationship between urinary incontinence and sex steroids seems obvious, as the presence of oestrogen receptors has been observed not only in lower urinary tract and in the muscle-fascia structures of the minor pelvis, but also in cortical centres responsible for micturition, in pons (where another micturi-

tion control centre is located), and in hypothalamus in the centres that regulate urination. Low concentrations of endogenous sex steroids from ovaries, which is the case during menopause, cause a range of lesions in the genital area, minor pelvis, and lower urinary tract. Because of the common origins and anatomical proximity of genitourinary organs, the atrophy of the birth canal impacts the condition of the lower urinary tract and continence processes. The structure of non-keratinized stratified squamous epithelium is directly related to the activity of sex hormones. After menopause, this epithelium becomes thin, built of only a few layers of the basic layer cells. The self-cleaning mechanism in vagina that prevents it from being colonised by atypical microorganisms is also dependent on hormones. The production by *Lactobacillus vaginalis* (Döderlein's bacteria), the physiological flora of the vagina, of the physiological disinfectant – lactic acid – is possible thanks to sex hormones. The proximity of the urinary system makes it possible for vaginal inflammations to be accompanied by chronic infections to the lower urinary tract, which are immune to treatment. The atrophy of urethral epithelium may lead to the so-called atrophic senile urethritis.

In the bladder, oestrogen receptors appear in the trigone of the bladder region, where the bladder epithelium is similar to the vaginal wall epithelium. Postmenopausal oestrogen shortage might increase the detrusor muscle activity. The muscle-fascia structures of the minor pelvic floor, which are related to the statics of genitals and continence, have receptors for sex steroids. Oestrogen and progesterone receptors are present in the cardinal ligament, uterosacral ligament, pubovesical fascia, paracolpium tissue, and levator ani muscle [1,2,7,8,10,11,12].

- Infections

Past infections of the urinary tract and its impact on incontinence frequency have been subject to many studies. Yernell observed a strong correlation between past occurrences of cystitis and mixed urinary incontinence. This might be a derivate process constituting a neurological response [1].

- Medications

Medications might cause both stress and urge incontinence. Medications causing increased diuresis may cause urinary urgency and incontinence. Some psychiatric drugs might affect neurotransmitters, which could cause bladder dysfunctions. Antidepressants and alpha-adrenergic receptor blockers might affect the urethra closure mechanism and thus, cause stress incontinence [2].

- Irritant grocery products

Amount and type of grocery products consumed may contribute to the occurrence of incontinence. Caffeine and al-

cohol are described as factors facilitating the ailment, yet this mechanism has not been explored thoroughly. Some foods have low pH and require the intake of a lot of liquid to reduce their irritating impact. This causes frequent urination (polyuria). Other products cause urinary urgency and incontinence. This definitely includes tea and coffee, as caffeine and theine are heavily irritating to the bladder. Even decaffeinated coffee and green and herbal teas (apart from mint and camomile) cause bladder irritation. Other products are sparkling drinks and drinks containing aspartame, because of the carbon dioxide, artificial sweeteners and often also caffeine. Similar effects are caused by watermelons, melons, and strawberries [1,2,6].

- Pulmonary diseases

Lung diseases, sleep apnoea, and smoking cigarettes also have something to do with incontinence. Smoking can inhibit the production of collagen, thus weakening the pelvic floor and cause chronic cough. Coughing contributes to sudden pressure rises in the abdomen, which can cause stress incontinence. Decreased collagen production resulting from an oxygen shortage (hypoxia) is a probable cause of stress incontinence in patients with chronic obstructive pulmonary disease. Patients with apnoea have been observed to suffer from incontinence caused by urinary urges [1].

Causing factors

- Surgeries in the uterus area

Incontinence in women is often related to surgeries performed on pelvic organs. Hysterectomy (uterus removal) is often named as a risk factor for this ailment. Incontinence resulting from urinary urgency might also be related to the damage suffered by plexus hypogastricus inferior. It has been observed that gynaecological surgeries via vagina are more risky than abdominal surgeries. What is more, this type of surgery changes the topography of pelvic organs, impacting the angle between bladder and urethra from acute to obtuse. Major operations, especially oncologic ones where the element of effectiveness is the so-called oncologic barrenness, are related to the removal of plexuses in the bladder and sphincter apparatus, causing serious disorders of the detrusor-sphincter correlation [13].

- Damage to nerves and muscles

It used to be believed that two large risk factors for incontinence are pregnancy and delivery. The foetus was believed to significantly damage the nerves and muscles of pelvic floor when proceeding through the birth canal. It used to be noted that: natural birth, delivery after 42nd week of pregnancy, foetus weighing more than 4000 g, delivery

lasting more than 24 hours, oxytocin induction and delivering more than twice could all cause lesions and disorders of the pelvic floor. Currently, however, the impact of these factors on increased frequency of urinary incontinence is negated. Of course, it does not change the fact that any perineum trauma inflicted during delivery might lead to urinary incontinence and that the delivery itself does cause some damage to the pelvic floor muscles, which should undergo rehabilitation later on. The number of urinary incontinence cases rises along with the number of deliveries. It remains unclear whether natural delivery and full duration of pregnancy increase the risk of urinary incontinence. Still, most researchers agree that natural delivery is a risk factor for stress incontinence [13,14].

- Radiotherapy

Frequent results of pelvic floor radiation are changes in the innervation of lower urinary tract. Complications after radiotherapy may surface many years after the treatment and cause detrusor overreactivity and decreased capacity of the bladder, which may result in both incontinence and urinary urgency [1,2].

- Physical activity

Low level of physical activity causes incontinence. Its direct cause is muscle weakness or muscular dystrophy in the pelvic floor, whose result is the lowering of genitals, excessive mobility of urethra, and increasing body weight. In turn, higher level of physical activity related to doing sports and performing certain tasks (heavy labour, weight-lifting) may pre-dispose for urinary incontinence [15,16].

- Obesity

Body mass index (BMI) is a significant factor for the development and occurrence of urinary incontinence in women. Obesity increases the susceptibility by 1.6% in the course of 5 years. As many as 25% of women with genital prolapse and urinary incontinence are below $>30 \text{ kg/m}^2$ on the BMI scale [1].

- Mental factors

Recent studies have shown a distinct correlation between certain mental diseases. Urinary incontinence resulting from urinary urges is related to depression, and the probable cause of this is lower concentration of serotonin [18]. What is more, mental illnesses require medications, and some of the drugs might impact continence [17].

Decompensation factors (age, dementia, environmental diseases)

Most authors claim that the frequency of urinary incontinence is rising with age. The factors affecting it are: weakened muscles, memory issues, disorders of blood supply to pelvic organs, co-occurring diseases, and medications applied [1,2,17].

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